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Two new species of the Neotropical spittlebug genus *Monecphora* Amyot & Serville (Hemiptera: Cercopidae) with key and notes of species of the genus

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Abstract

Two new species of the Neotropical spittlebug genus *Monecphora* Amyot & Serville are described: *Monecphora machadoi* sp. nov. (Holotype male deposited in NMW: Brazil, “Natterer”) and *Monecphora broomfieldi* sp. nov. (Holotype male deposited in BMNH: Costa Rica, Turrialba, 3–8.VII.1981, W.R. Dolling leg.) and a key and notes to species of the genus are provided. Lectotypes are designated for *Tomaspis fryi* Distant, *Monecphora nigritarsis* Stål, and *Monecphora semilutea* Stål. In addition, two corrections are made to the *Cercopid Spittlebugs of the New World* (Carvalho & Webb 2005) with respect to figures 70–73 and 193–194 (see Corrigenda).

Key words: Ischnorhininae, Tomaspidini, taxonomy

Introduction

Cercopidae is the largest xylem-sap sucking insect family in the World. Its members are characterized by their bright color patterns and, together with the closely related Aphrophoridae, their adults jump well and some look like small frogs and their nymphs produce frothy excreta, characteristics which have given rise to their common names of froghoppers and spittlebugs. The New World taxa of the family were treated by Carvalho & Webb (2005), giving type specimen details and figures for most species, including those of *Monecphora* Amyot & Serville (1843). This genus has had a checkered history. It was erected for *Cercopis cingulata* Le Peletier & Serville, 1825 (type species), *Cercopis rubra* Fabricius, 1803, *Cercopis humeralis* Le Peletier & Serville, 1825, and *Cercopis lanio* Le Peletier & Serville, 1825. Subsequently, Walker (1851) described several new species in the genus from various regions, but all were subsequently moved to other genera. Lallemand (1912) synonymized the genus with *Tomaspis* Amyot & Serville, 1843, but Metcalf & Brunner (1944) reversed this action and Metcalf (1961) listed 30 species with their synonyms and distribution. Once again, many of these species were subsequently moved to other genera (Fennah 1968, 1979; Hamilton 1977; Nast 1979) resulting in nine species being included by Carvalho & Webb (2005).

In a recent paper, Paladini *et al.* (2015) proposed a hypothesis of phylogenetic relationships for New World spittlebug genera based on morphological data. This study found that *Monecphora* is the sister group to a clade composed of *Catrimania* Fennah, 1968, *Tunaima* Fennah, 1968, *Panabrus* Fennah, 1953, and *Sphenorhina* Amyot & Serville, 1843.

In the present paper we describe two new species and provide a key for separation all species of the genus. In addition, two corrections are made to the *Cercopid Spittlebugs of the New World* (Carvalho & Webb 2005) with respect to figures 70–73 and 193–194 (see Corrigenda).

Material and methods

Morphological terminology follows Fennah (1968). Measurements were taken with an eyepiece micrometer. The following institutional abbreviations are used throughout the text:

BMNH	The Natural History Museum, London, U.K.;
DZUP	Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Brazil;
FIOC	Fundaçao Oswaldo Cruz, Rio de Janeiro, Brazil;
MAPA	Museu Anchieta, Porto Alegre, RS, Brazil;
MCTP	Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre, Brazil;
NMW	Naturhistorisches Museum Wien, Austria;
NRS	Naturhistoriska Riksmusset, Stockholm, Sweden.

Taxonomy

Monecphora Amyot & Serville, 1843

Monecphora Amyot & Serville, 1843: 562; Metcalf, 1961: 221–223; Fennah, 1968: 177.

Type species: *Cercopis cingulata* Le Peletier & Serville, by original designation.

Key to species of *Monecphora*

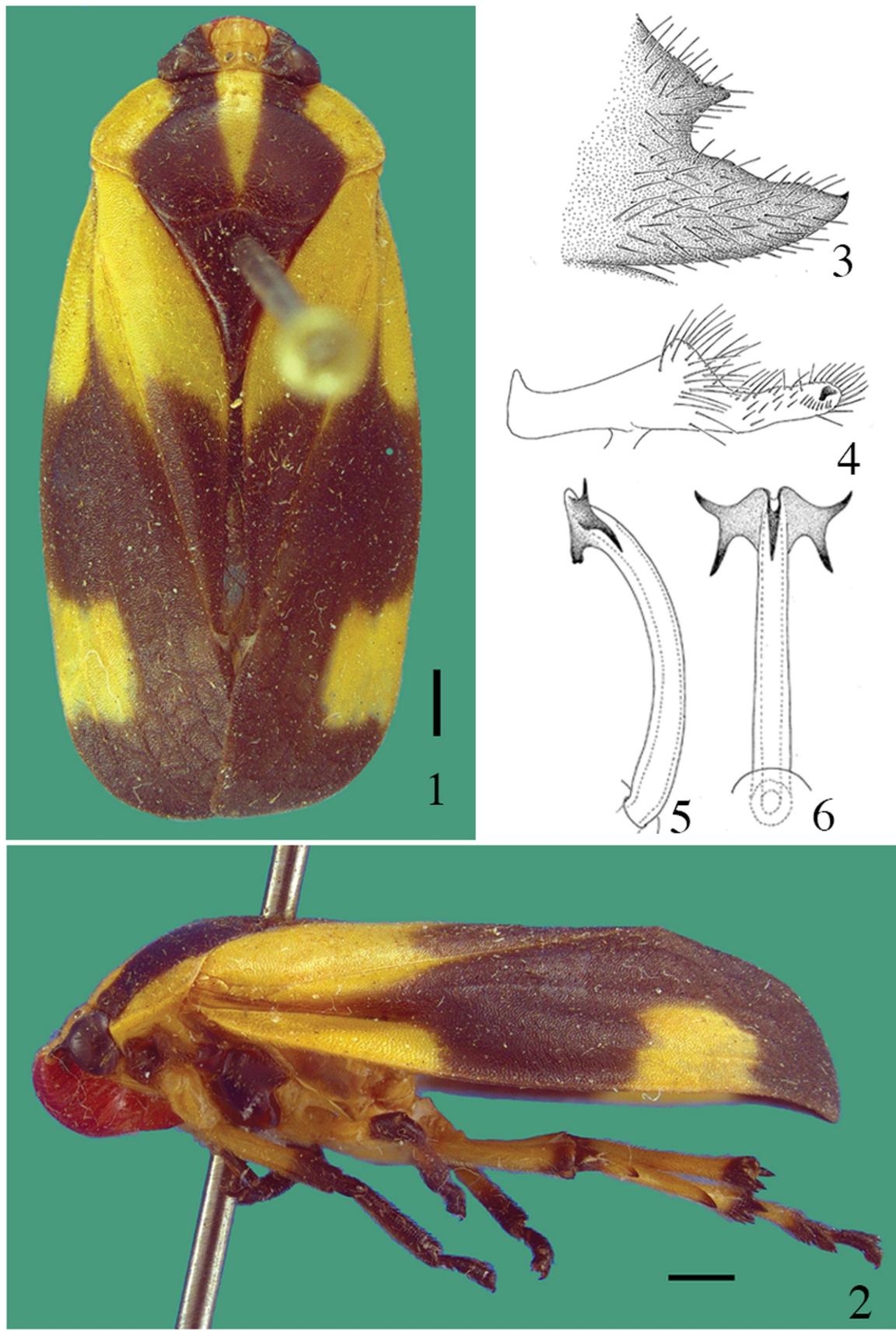
1. Forewing unicolorous or with a distal spot or transverse band..... 5
- 1'. Forewing with one or two longitudinal bands..... 2
- 2(1'). Pronotum completely dark-brown; forewing with a yellow longitudinal band from clavus base up to last fourth of corium (Fig. 17)..... *M. sopolisi*
- 2'. Pronotum not dark-brown..... 3
- 3(2'). Forewing with basal half of clavus and a longitudinal band in corium gradually narrowing towards apex, pale ochraceous (Fig. 9)..... *M. fryi*
- 3'. Forewing with longitudinal band of corium not narrowing towards apex..... 4
- 4(3'). Pronotum light brown with a longitudinal medial band and another band on latero-anterior margin, ocher-yellow; forewing with costal margin with a band along anterior half and a large quadrate macula opposite to tip of clavus, ocher-yellow..... *M. opulenta*
- 4'. Pronotum ocher-yellow with a transverse median stripe and the posterior margin, dark-brown; forewing with a longitudinal ocher-yellow band at middle of corium not reaching tip (Fig. 18)..... *M. longitudinalis*
- 5(1). Forewing unicolorous, opaque basally, becoming transparent distally (Fig. 19)..... *M. pallida*
- 5'. Forewing not unicolorous..... 6
- 6(5'). Forewing with a narrow transverse band at level of scutellum tip (Fig. 7)..... *M. cingulata*
- 6'. Forewing without narrow transverse band at level of scutellum tip..... 7
- 7(6'). Forewing broadly marked with brown distally..... 8
- 7'. Forewing translucent grey with a brown spot distally (Fig. 15)..... *M. nigritarsis*
- 8(7). Forewing with distal 4/5 of corium dark-brown (Fig. 16)..... *M. semilutea*
- 8'. Forewing with distal one or two-thirds of corium brown..... 9
- 9(8'). Pronotum with paired thick brown longitudinal bands (Figs 1–2)..... *M. broomfieldi* sp. nov.
- 9'. Pronotum without longitudinal brown bands, may have transverse band..... 10
- 10(9'). Forewing with distal two-thirds of corium light-brown and proximal third yellow (Fig. 10)..... *M. machadoi* sp. nov.
- 10'. Forewing with distal third of corium dark-brown and proximal two-thirds ochraceous (Fig. 20)..... *M. nigroapicata*

Monecphora broomfieldi sp. nov.

(Figures 1–6)

Material examined. Holotype male: “COSTA RICA / Turrialba, Catie / IICA Research Station. / 3–8.vii.1981 / W. R. Dolling / B.M. 1981 – 411” (BMNH). Paratypes: 2 males (DZUP, BMNH) and 3 females (MCTP, DZUP, BMNH), same data as holotype; 1 female, “COSTA RICA: Heredia / Chilamate / 75 msnm 25.ii.1989 / col. C. Godoy” (MCTP); 1 female, “COSTA RICA / Lallemand Coll. / B.M. 1955–832” (BMNH).

Measurements (in mm). Mean (range) of 3 males / 3 females. Body length: 12.2 (11.5–13.2) / 12.1 (10.5–13.0).



FIGURES 1–6. *Monecphora broomfieldi* sp. nov. (holotype). 1–2. dorsal and lateral habitus respectively; 3. apex of male pygofer and subgenital plate, lateral view (flattened on slide); 4. paramere, external lateral view; 5. aedeagus, lateral view; 6. aedeagus, anterior view. Scale bars = 1 mm.

Description. Dorsum yellow marked with dark brown on head laterally, between eye and longitudinal fovea and antennal margin, as two longitudinal stripes on pronotum continuing from head and slightly widening posteriorly until latero-posterior and posterior margins and extending onto scutellum posteriorly. Forewings with distal two thirds dark brown with basal third and subapical costal quadrangular spot, yellow. Face with postclypeus and anteclypeus sanguineous. Rostrum yellow with apical segment brown. Antennae dark brown. Mesothorax brown. Legs yellow with tip of femur, tibia and tarsi, dark brown. Abdomen red. Forewing venation not apparent, except distally, reticulate. Male pygofer with triangular latero-posterior lobe (Fig. 3). Parameres in lateral view with base of apophysis triangular shaped dorsally, thereafter digitate to rounded apex with apical bifurcated tooth turned laterally (Fig. 4). Aedeagal shaft curved posterodorsally, apex with an anterior median spine and an apically flange-like process on each side terminating in a pair of hook-like projections (Figs 5–6). Ovipositor with basal processes small and spoon-shaped.

Etymology. This species is named after Peter Broomfield (ex-BMNH) who did the genitalia drawings used here and most of the drawings used in the *Cercopid Spittlebugs of the New World* (Carvalho & Webb 2005).

Remarks. The new species have aedeagus processes similar to *M. pallida* Lallemand, 1924, but differs from this and other species in its color pattern.

***Monecphora cingulata* (Le Peletier & Serville, 1825)**

(Figures 7–8)

Cercopis cingulata Le Peletier & Serville, 1825: 606.

Monecphora cingulata; Amyot & Serville, 1843: 562.

= *Monecphora soligena* Walker, 1858: 177 (syn. *apud* Stål, 1862: 493); Metcalf, 1961: 225.

Tomaspis (*T.*) *cingulata*; Lallemand, 1912: 91.

Monecphora cingulata; Metcalf, 1961: 224–225; Carvalho & Webb, 2005: 77, fig. 193 (male genitalia) (not 194, error in legend), 664 (lateral habitus)

Material examined. BRAZIL: **Rio de Janeiro:** syntypes of *M. soligena*: 1 female “Type”, “Petropolis/ Feb. 1857/ J. Gray” (BMNH); 1 male, 2 females, 1 specimen, Petropolis (BMNH); 2 males, Floresta da Tijuca, XI.1957, M. Alvarenga (DZUP); 1 male, Teresópolis, 2–5.XII.1958, Martinez, Werner, Alvarenga & Seabra (DZUP); **Paraná:** 2 females, Barra do Paraná, 19–27.II.1993, A. Bonaldo (MCTP); **Santa Catarina:** 1 male, Chapecó, 15.IX.1998, Garcia, F.R. (MCTP); **Rio Grande do Sul:** 8 males, Cerro Largo, I.1931, Pe. Buck (MAPA); 1 male, Rondinha, I.1997, Rupollo, G. (MCTP); 6 males, Rondinha, 26.I.2001, Specht, A. (MCTP). ARGENTINA: **Misiones:** 2 males 1 female, Missiones (32 km SE Alcazar), 04.I.2008, Gonçalves, A. C. (MCTP); several specimens (males and females), various localities and dates (BMNH).

Remarks. In Carvalho & Webb (2005, p. 213), the figures of this species should be 193, not 194 (error in legend).

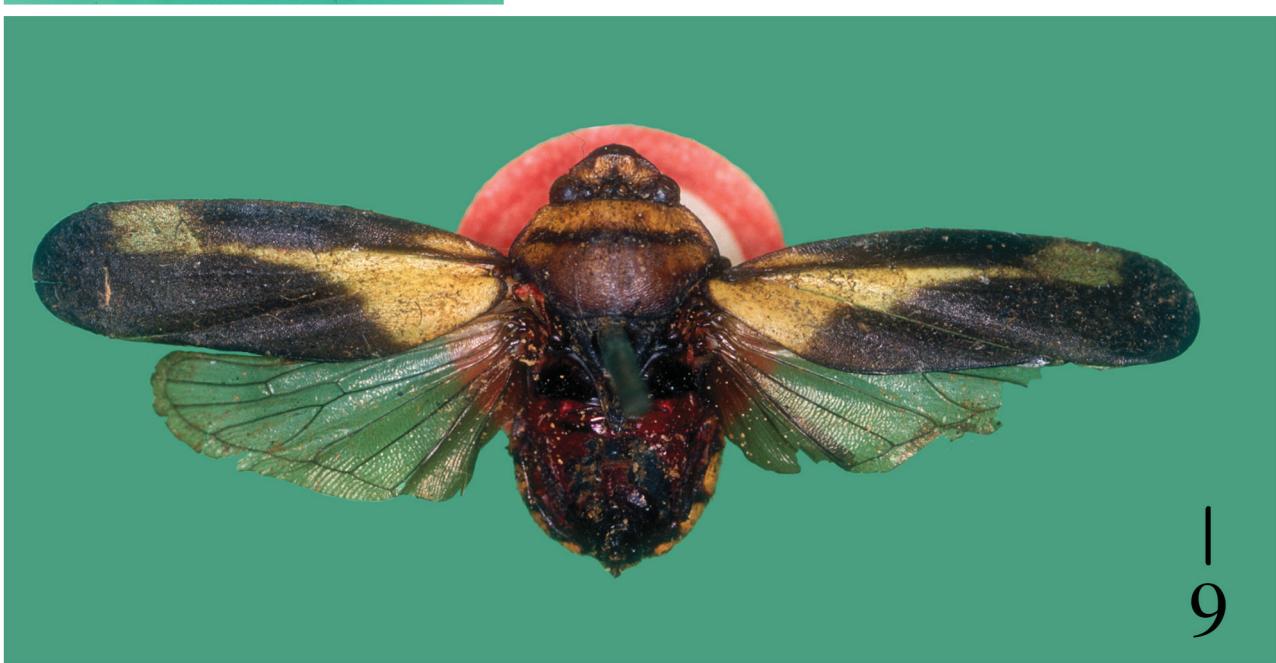
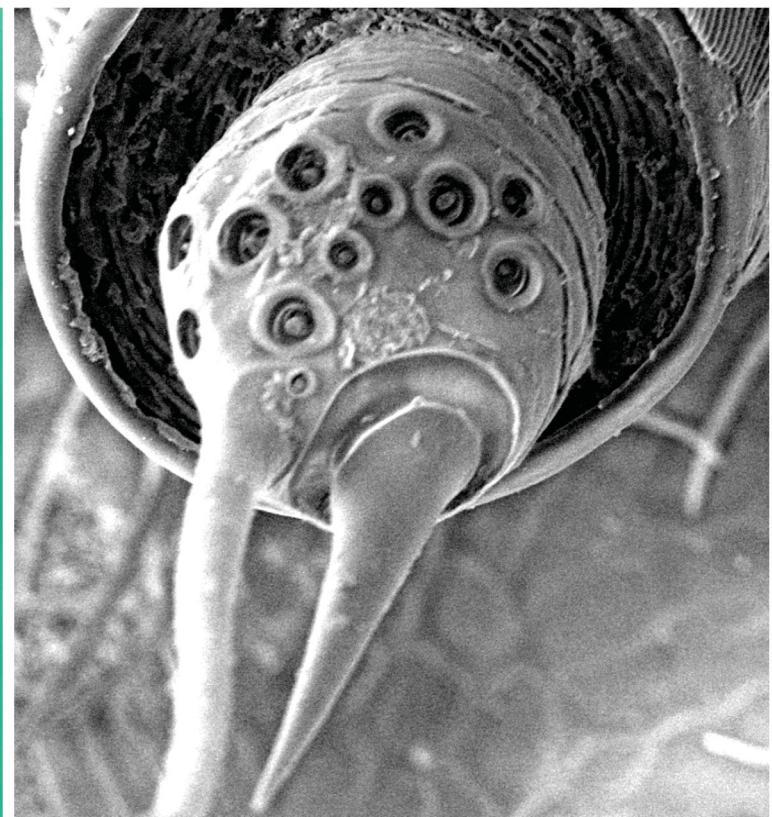
***Monecphora fryi* (Distant, 1909)**

(Figure 9)

Tomaspis fryi Distant, 1909: 195; Metcalf, 1961: 96.

Monecphora fryi; Fennah, 1968: 177; Carvalho & Webb, 2005: 77, fig. 611 (lateral habitus).

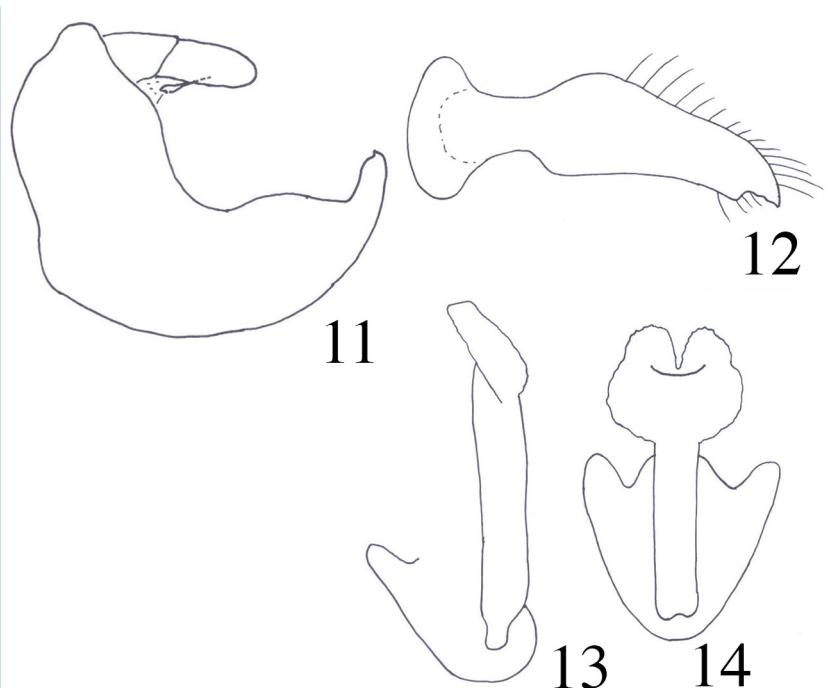
Material examined. Lectotype female (here designated) (no data), “Type”, “Tomaspis/ fryi Dist./ type” (BMNH); BRAZIL: **Rio de Janeiro:** 1 female, Itatiaia-RJ, 05.XI.1931, J.F.Zikán (FIOC); 1 female, same data except, 22.XII.1933 (MCTP).



FIGURES 7–9. *Monecphora* species, dorsal habitus and detail of third antennal segment. 7–8. *M. cingulata*; 9. *M. fryi* (lectotype female). Scale bars = 1 mm.



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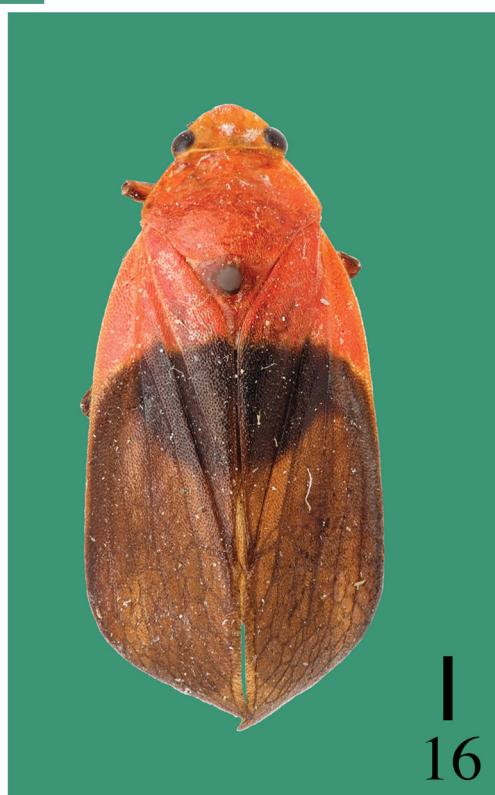
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FIGURES 10–17. *Monecphora* species, dorsal habitus and genitalia. 10–14. *Monecphora machadoi* sp. nov. (male paratype); 10. dorsal habitus; 11. male pygofer and subgenital plate, lateral view; 12. paramere, external lateral view; 13. aedeagus, lateral view; 14. aedeagus, posterior view; 15. *M. nigritarsis*; 16. *M. semilutea*; 17. *M. sipolisi*. Scale bars = 1 mm.

***Monecphora machadoi* sp. nov.**

(Figures 10–14)

Material examined. Holotype male: “BRAZIL / Natterer / Brasilien” (NMW). Paratypes: 2 females, “BRAZIL / Stieglmayr / Rio Gr. do Sul” (NMW); 3 females, “BRAZIL / Brasilien / Nova Teutonia / 27°11' B. 52° 23' L. / Fritz Plaumann / 24. 11. 1938 // Lallemand Coll. / B.M. 1955-832.” (BMNH); 1 female, “BRAZIL / Brasilia / Rio Grande” (BMNH); 1 female, “BRAZIL / Rio Brilhante-MT / Brasil – 21/10/1970 / V.O. Becker legit” (MCTP); 1 female, “BRAZIL / Chap. dos Guimarães-MT / 22–25.XI.1983 / Exc. Dep. Zool. UFPR / (Polonoroeste) / Malaise” (DZUP).

Measurements (in mm). Mean (range) of 1 male / 8 females. Body length: 11.6 (11.6) / 12.2 (10.8–13.8).

Description. Vertex yellow marked with dark-brown on posterior margin and between ocelli. Forewing basally yellow variably tinged with green; distal two-thirds of corium and tip of clavus, pale-brown. Face with postclypeus yellowish-orange with a dark-brown pit in front of tylus; anteclypeus yellowish-orange with dark-brown tip. Rostrum and antennae, dark-brown. Pronotum yellow tinged with green posteriorly with a transverse line between anterior and median third and posterior margin, dark brown. Mesothorax dark brown. Legs yellow with proximal and distal area of tibia and tarsi, dark brown. Abdomen yellowish-brown with the anterior margin of segments dark-brown.

Male pygofer without latero-posterior lobe (Fig. 11). Parameres in lateral view with base of apophysis evenly and shallowly convex dorsally, ventral margin subapically abruptly narrowed tooth-like with a downwardly directed apical spine (Fig. 12). Aedeagal shaft with basal two thirds straight, thereafter with large apical angled flange-like expansion on each side, without processes (Figs 13–14). Ovipositor with basal processes small and spoon-shaped.

Etymology. The specific name is in honor of Angelo B. M. Machado the influential Brazilian researcher and entomologist, on the occasion of his 80th birthday.

Remarks. This species can be distinguished by its distinctive color pattern and aedeagal shaft with large apical expansion on each side, without apical medial spinose process.

***Monecphora nigritarsis* Stål, 1862**

(Figure 15)

Monecphora nigritarsis Stål, 1862: 14.

Tomaspis nigritarsis; Lallemand, 1912: 95.

Monecphora nigritarsis; Carvalho & Webb, 2005: 78, fig. 192 (male genitalia), 458 (lateral habitus).

Material examined. BRAZIL: Lectotype female (here designated), BRAZIL (NRS); **Rio de Janeiro:** 1 male, Itatiaia, 1300 m, 6–10.12.950, Trav[assos] & H. Trav[assos] leg. (FIOC); **Paraná:** 1 female, Foz do Iguaçu 7.XII.66, Noite—Lamp. Merc. [light trap], D.Zoo.U.F.P. leg. (DZUP); **Rio Grande do Sul:** 1 male, Sta. Cruz Sul RS, 12.X.96, Petersen, A. leg. (MCTP); 1 male, Pelotas, V-1939, C.M. Biezanko leg. (BMNH); 1 male, Canela, 18.II.90, M. Hoffmann leg. (MCTP); ARGENTINA: **Misiones:** 4 females, Misiones (32 km SE Alcazar), 04.I.2008, Gonçalves, A.C. leg. (MCTP).

***Monecphora semilutea* Stål, 1854**

(Figure 16)

Monecphora semilutea Stål, 1854: 249.

Tomaspis semilutea; Lallemand, 1912: 97. Metcalf, 1961: 11.

Monecphora semilutea; Carvalho & Webb, 2005: 78, fig. 194 (not 193, error in legend and text) (male genitalia), 463 (lateral habitus).

Material examined. BRAZIL: Lectotype male (here designated), 1 female (Paralectotype), BRAZIL (NRS).

Remarks. In Carvalho & Webb (2005, p. 213), the plate for this species should be 194, not 193 (error in legend).



FIGURES 18–20. *Monecphora* species, dorsal habitus. 18. *M. longitudinalis*; 19. *M. pallida*; 20. *M. nigroapicata*. Scale bars = 1 mm.

Monecphora sipolisi (Fallou, 1890)

(Figure 17)

Sphenorhina sipolisi Fallou, 1890: 352.

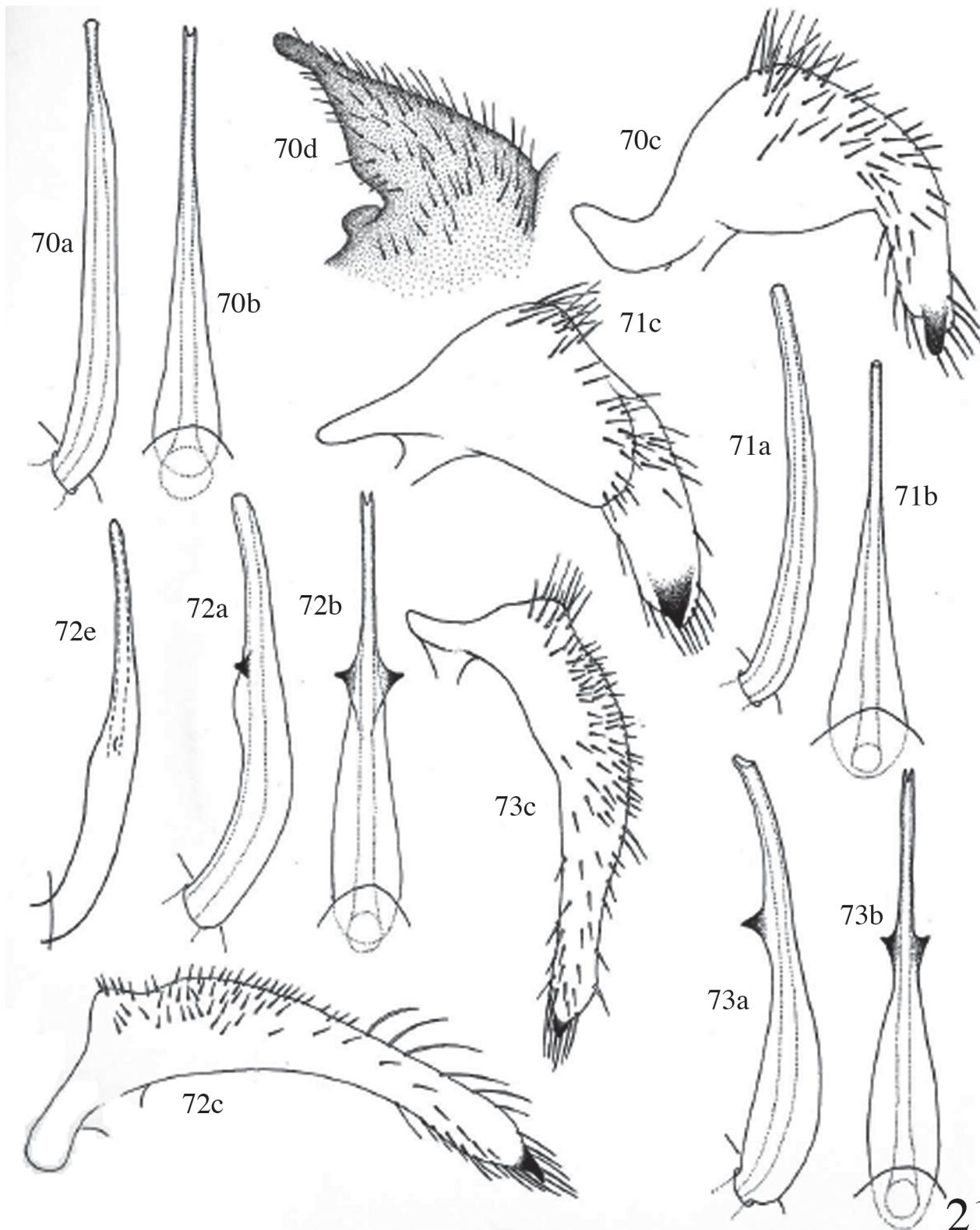
Monecphora sipolisi; Carvalho & Webb, 2005: 78, fig. 363 (lateral habitus).

Material examined. BRAZIL: Minas Gerais: 1 female, Passa Quatro (FIOC); 1 female, Minas Gerais (BMNH); Rio Grande do Sul: 1 female, Cerro Azul (MAPA); 1 female (no locality) Fry coll. 1905. 100 (BMNH).

Remarks. The specimen from Minas Gerais (BMNH) lacks the yellow band on the pronotum of other specimens and the other BMNH specimen is smaller (10mm) than other specimens. The syntype(s) from Brazil (MNHN) could not be found in Fallou's collection (MNHN). According to the pin holes under the specimen name in the collection (pers. com. Adeline Soulier-Perkins) one or more specimens were present at some time in the past.

Corrigenda

On page 180 of the book *Cercopid Spittlebugs of the New World (Hemiptera, Auchenorrhyncha, Cercopidae)* by Carvalho & Webb (2005) the wrong figures are reproduced for “Figs 70–72” being a duplicate of “Figs 99–101”, although the legend is correct. Here we include the correct plate (see Fig. 21). Also, on page 213, “Fig. 193” refers to *M. cingulata* and “Fig. 194” to *M. semilutea*.



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FIGURE 21. Corrigenda. Original plate omitted in error from Carvalho & Webb (2005, figs 70–73). *Iphirhina* species, male genitalia. 70, *Iphirhina quota* (Distant) (syntype male). 71, *I. perfecta* (Walker) (Colombia). 72, *I. limbata* (Stål): e aedeagus, left lateral view (a–c Guatemala, e syntype). 73, *I. discontinua* (Fowler) (syntype male). a aedeagus, left lateral view; b aedeagus, anterior view; c left paramere, lateral view; d male subgenital plate and adjacent area of pygofer, ventrolateral view (see additional comments on figures in Carvalho & Webb 2005, p. 34–36).

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